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The Cladoniae of New Jersey—Second Supplement¹

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The writer's report on the *Cladoniae* of New Jersey (25)² was published in 1935 and recorded the results of exploration down to the close of 1934. This report was followed three years later by a supplement (33), which brought the record down to the close of 1937. The stations listed in the supplement were based largely on the careful collections made by Mr. Raymond H. Torrey, who gathered ample material in various parts of the state.

Since the death of Mr. Torrey in July, 1938, the exploration for *Cladoniae* in New Jersey has been continued with most interesting results by Mr. G. G. Nearing of Ridgewood, who is well known to readers of *Torreyia* for his various articles on lichens. Mr. Nearing has not only made new discoveries in some of the localities visited by Mr. Torrey and others but has also collected in many additional localities. As a result our knowledge of local distribution within the state has been greatly increased, and certain species have proved to be more abundant and more widely distributed than the earlier reports indicated. The present supplement, which brings the record down to the close of 1939, is based very largely on Mr. Nearing's collections but includes a number of additional reports from specimens collected by Mr. W. L. Dix, Mrs. C. A. Dunham, Dr. J. A. Small, Dr. J. W. Thomson, and other botanists, most of whom are mentioned in the writer's report or first supplement.

During the past two years Dr. Heinrich Sandstede has published a supplement (34) to Vainio's *Monographia Cladoniarum universalis* (22) and two articles in Hannig and Winkler's *Pflanzenareale* on the distribution of the *Cladoniae* throughout the world (35, 36). In each of these important works references to New Jersey speci-

¹ Contribution from the Osborn Botanical Laboratory.

² Numbers in bold-face type refer to the titles given in the original report and first supplement and to the additional titles listed at the close of the second supplement.

mens are included. Another valuable memoir which cites New Jersey *Cladoniae* is H. des Abbayes' revision of the subgenus *Cladina* (32), which appeared in 1939. References in these various works which relate to definite New Jersey material will be listed under individual species in the present supplement.

In the following list, which adheres to the arrangement used in the original report, all records with neither dates nor collectors' names are based on specimens collected by Mr. Nearing in 1939; records marked simply "1938" are likewise based on Mr. Nearing's specimens. In all other cases both dates and collectors' names are given, and records dated 1937 or earlier are here published for the first time. With rare exceptions new records duplicating earlier records are omitted. Species and forms marked by asterisks (*) represent additions to the flora of New Jersey.

This second supplement adds 35 forms and the following three species to the *Cladoniae* of New Jersey: *C. vulcanica* Zolling., *C. nanodes* Robbins, and *C. gracilis* (L.) Willd. The total number of species now known from the state is 49. The specimens upon which the records are based are preserved in the herbarium of Yale University.

Subgenus 1. CLADINA

1. CLADONIA RANGIFERINA (L.) Web. (25, p. 84). Accredited to New Jersey, by des Abbayes (32, p. 146) on the basis of Mr. Nearing's specimens. BERGEN: Bear Swamp Pond. MORRIS: Oak Ridge. PASSAIC: Bearfort Mountain, Franklin Clove, Haskell, and Mountain Glen Lakes near Upper Macopin. SUSSEX: Andover, Colesville, and Hamburg Mountain. WARREN: Lookout Rock near Pequest (1938).

1a. CLADONIA RANGIFERINA f. CRISPATA Coem. (25, p. 85). PASSAIC: Franklin Clove.

1c. CLADONIA RANGIFERINA f. PROLIFERA Flot. (25, p. 85). BERGEN: Bear Swamp Pond (det. Sandstede).

1e.* CLADONIA RANGIFERINA f. LEUCITICA Flot. (26, p. 7). PASSAIC: Stonetown.

2. CLADONIA SYLVATICA (L.) Hoffm. (25, p. 85). Listed from New Jersey by des Abbayes (32, p. 135) on the basis of Mr. Nearing's specimens. BERGEN: Bear Swamp Pond, Darlington, Franklin Lake, and Paramus. BURLINGTON: near Red Lion (*Dix*,

1939). CUMBERLAND: Vineland. MERCER: Sourland Mountain (*Dix*, 1939). MORRIS: Oak Ridge. OCEAN: Lakewood and Laurelton. PASSAIC: Bearfort Mountain, Haskell, Hewitt, Mountain Glen Lakes near Upper Macopin, and Stonetown. SUSSEX: Hamburg Mountain and Kittatinny Mountain.

2c.* *CLADONIA SYLVATICA* f. *PROLIFERA* Sandst. (4, p. 381). PASSAIC: Stonetown.

3. *CLADONIA MITIS* Sandst. (25, p. 86). Accredited to New Jersey by des Abbayes (32, p. 127) on the basis of Mr. Nearing's specimens. BERGEN: Bear Swamp Pond, Franklin Lake and Mills, near Mahwah (1938), Paramus (1938), Ridgewood (1938) Washington, and Wyckoff. BURLINGTON: Martha (1938). CUMBERLAND: Vineland. ESSEX: North Caldwell. MIDDLESEX: Old Bridge. MONMOUTH: Morganville and Spring Valley. OCEAN: Lakewood and Sim's Place. PASSAIC: Bearfort Mountain, Franklin Clove, and Hewitt. SUSSEX: Kittatinny Mountain.

3b. *CLADONIA MITIS* f. *PROLIFERA* Sandst. (25, p. 86). BERGEN: Bear Swamp Pond, Franklin Lake, and near Mahwah (1938). MONMOUTH: Morganville. PASSAIC: Bearfort Mountain.

4. *CLADONIA TENUIS*: (Floerke) Harm. (25, p. 86). In the opinion of des Abbayes the North American specimens which have been referred to *C. tenuis* are not identical with European specimens of this species. He therefore separates the North American plant as a geographical subspecies, to which he gives the name **Cladonia subtenuis* (32, p. 108), indicating the subspecific rank by means of the asterisk. In the true *C. tenuis*, according to his account, the ultimate podetial branches are curved in the same direction, whereas in **C. subtenuis* they are either straight or curved in various directions. In the southern parts of its range **C. subtenuis* seems to be amply distinct from the true *C. tenuis*, but in some of the more northern forms the differential features are less fully realized. On account of the existence of such forms des Abbayes hesitates to give **C. subtenuis* full specific rank. He lists his subspecies from New Jersey and cites specimens collected by Blake, Cohn, and Nearing, as well as those distributed in Lich. Bor.-Amer., No. 63 (see 25, p. 86). According to his interpretation the specimens here listed under *C. tenuis* represent the subspecies **C. subtenuis* des Abbayes. BERGEN: Allendale, Bear Swamp Pond, Darlington, Emerson (1938), Franklin Lake and

Mills, Hohokus (1938), Mahwah (1938), Paramus, Saddle River (*Mrs. Dunham*, 1939), Waldwick, and Wyckoff. BURLINGTON: near Bordentown (*Dix*, 1939), Jenkins (1938), and Red Lion (*Dix*, 1939). ESSEX: Eagle Rock Reservation (1938) and North Caldwell. GLOUCESTER: Mullica Hill. HUNTERDON: Bissell, Oldwick, Rileyville, and Ringoes. MERCER: Dutch Neck, Hopewell (*Dix*, 1939) and Pennington (*Dix*, 1939). MONMOUTH: Ardena and Cranberry Hill. MORRIS: Green Village, Hanover Neck, New Vernon, Oak Ridge, and Waughaw Mountain. OCEAN: Forked River and Pasadena. PASSAIC: Franklin Notch (1938), Goffle Ridge near Haledon, Haskell, Hewitt, Monks, and Stonetown. SALEM: Centerton and Norma. SOMERSET: North Plainfield. SUSSEX: Andover, Colesville, Franklin, south of Lake Hartung Road (1938), Ogdensburg, and near Sussex (*Cohn*, 1937). WARREN: White Lake near Marksboro (1938).

4a. CLADONIA TENUIS f. SETIGERA Sandst. (25, p. 87). BERGEN: Mahwah (1938). BURLINGTON: near Bordentown (*Dix*, 1939) and Jenkins (1938).

4A. CLADONIA IMPEXA Harm. (33, p. 139). Listed from New Jersey by des Abbayes (32, p. 82), presumably on the basis of Cohn's specimens of f. *subpellucida* Harm. (33, p. 140) from Forked River, Ocean County. Mr. Nearing has since collected this form in the same locality.

Subgenus 2. PYCNOTHELIA

5a. CLADONIA PAPILLARIA (Ehrh.) Hoffm. f. MOLARIFORMIS (Hoffm.) Schaer. (25, p. 87). BERGEN: Closter, Darlington, Franklin Lake and Mills, Hillsdale (1938), Hohokus (1938), Mahwah (1938), Paramus (1938), Ridgewood (1938), Washington, and Wyckoff. BURLINGTON: Atsion (1938), near Bordertown (*Dix*, 1939), Green Bank (1938), and Martha (1938). GLOUCESTER: Mullica Hill. MIDDLESEX: Rhode Hall. MONMOUTH: Ardena and Morganville. MORRIS: Oak Ridge. OCEAN: Pasadena. PASSAIC: Hewitt and Monks. SALEM: Norma. SOMERSET: North Plainfield. SUSSEX: Kittatinny Mountain and Rock View near Montague.

5b. CLADONIA PAPILLARIA f. STIPATA Floerke (25, p. 87). BERGEN: Franklin Lake and Mahwah (1938). GLOUCESTER: Mullica Hill. PASSAIC: Haskell.

5c. *CLADONIA PAPILLARIA* f. *PAPILLOSA* Fr. (25, p. 87). BERGEN: Emerson (1938), Franklin Lake and Mills, Hohokus (1938), Mahwah (1938), Paramus (1938), Ridgewood (1938), Waldwick, Washington, and Wyckoff. BURLINGTON: Green Bank (1938). GLOUCESTER: Mullica Hill. MIDDLESEX: Old Bridge and Rhode Hall. MONMOUTH: Ardena, Cranberry Hill, and Morganville. MORRIS: Green Village, Mt. Freedom, and Oak Ridge. OCEAN: Forked River, Laurelton, and Pasadena. PASSAIC: Goffle Ridge near Haledon (1938), Haskell, Hewitt, Monks, and Stonetown. SALEM: Norma. SOMERSET: Lamington. SUSSEX: Kittatinny Mountain.

5d.* *CLADONIA PAPILLARIA* f. *PROLIFERA* (Wallr.) Schaer. (5, p. 124). Sandstede (34, p. 22) reports this form from New Jersey without citing definite stations.

Subgenus 3. CENOMYCE

Section 1. COCCIFERAE

Subsection 1. SUBGLAUDESCENTES

6a. *CLADONIA FLOERKEANA* (Fr.) Floerke var. *INTERMEDIA* Hepp (25, p. 88). BERGEN: near Mahwah (1938). ESSEX: North Caldwell. PASSAIC: Haskell, Hewitt, and Stonetown. SUSSEX: Rock View near Montague.

6b.* *CLADONIA FLOERKEANA* var. *CARCATA* (Ach.) Vainio (4, p. 394). BERGEN: near Mahwah (1938) and Ridgewood (1938). PASSAIC: Stonetown. SUSSEX: Hamburg Mountain.

7. *CLADONIA BACILLARIS* (Ach.) Nyl. (25, p. 88). BERGEN: Allendale, Alpine, Bear Swamp Pond, Closter, Darlington, Franklin Lake and Mills, Hackensack (1938), Hillsdale (1938), Hohokus (1938), Mahwah (1938), Maywood (1938), Paramus (1938), Ridgewood (1938), Rochelle Park (1938), Saddle River (1938), Upper Saddle River (1938), Waldwick, Washington, and Wyckoff. BURLINGTON: Brown's Mills (*Dir.*, 1939), Green Bank (1938), Martha (1938), and Quaker Bridge (1938). CUMBERLAND: Vine-land. ESSEX: North Caldwell and South Mountain Reservation (1938). GLOUCESTER: Bridgeport. HUNTERDON: Bissell, Rileyville, and Sourland Mountain (*Dir.*, 1939). MERCER: Mt. Rose. MIDDLESEX: Old Bridge, Rhode Hall, and South River. MONMOUTH: Ardena, Cranberry Hill, Morganville, and Spring Valley. MORRIS:

near Charlotteburg (1938), Great Swamp near Mt. Vernon, Green Village, Littleton, Mt. Freedom, New Vernon (1938), Oak Ridge, and Waughaw Mountain. OCEAN: Forked River, Laurelton, Pasadena, and Sim's Place. PASSAIC: Franklin Notch (1938), Goffle Ridge (1938) and High Mountain near Haledon, Haskell, Hewitt (*Nearing & Thomson*, 1939), Monks, Mountain Glen Lakes near Upper Macopin, and Stonetown. SALEM: Centerton and Elmer. SOMERSET: Warrentonville. SUSSEX: Andover, Colesville, Hamburg Mountain, Kittatinny Mountain, south of Lake Hartung Road (1938), Ogdensburg, Rock View near Montague, and near Sparta Lake (1938). UNION: Fanwood and Seely's Glen. WARREN: White Lake near Marksboro (1938).

7a.* CLADONIA BACILLARIS f. ABBREVIATA (Vainio) Harm. (5, p. 124). MONMOUTH: Spring Valley.

7b.* CLADONIA BACILLARIS f. CLAVATA (Ach.) Vainio (4, p. 397). CUMBERLAND: Vineland. OCEAN: Forked River.

7c.* CLADONIA BACILLARIS f. PERITHETA (Wallr.) Arn. (4, p. 397). PASSAIC: Hewitt and Mountain Glen Lakes near Upper Macopin.

7d.* CLADONIA BACILLARIS f. SUBTOMENTOSULA Sandst. (6, p. 38). CUMBERLAND: Vineland (*Nearing*, 1939, the earliest New Jersey record). OCEAN: Island Beach (*Dix*, 1939).

8a. CLADONIA MACILENTA Hoffm. f. STYRACELLA (Ach.) Vainio. (25, p. 88). BERGEN: Darlington, Franklin Lake and Mills, Mahwah, Ridgewood (1938), Rochelle Park (1938), Washington, and Wyckoff. ESSEX: North Caldwell. MONMOUTH: Spring Valley. MORRIS: Oak Ridge and Waughaw Mountain. OCEAN: Forked River and Pasadena. PASSAIC: Hewitt, Monks, and Stonetown. SUSSEX: Andover, Colesville, Hamburg Mountain, Kittatinny Mountain, and Rock View near Montague.

9b. CLADONIA DIDYMA (Fée) Vainio f. SUBULATA Sandst. (25, p. 89). OCEAN: Lakewood.

9c.* CLADONIA DIDYMA f. SQUAMULOSA Robbins (5, p. 127). OCEAN: Sim's Place.

9A.* CLADONIA VULCANICA Zolling. in Hasskarl, Natur.-Geneesk. Arch. Neêrlands Indie 1:396. 1847. *C. didyma* var. *vulcanica* Vainio, Acta Soc. F. et Fl. Fennica 4:145. 1887 (as *vulcanica*); Zahlbr. Cat. Lich. Univ. 4:490. 1926. In its morpho-

logical features *C. vulcanica* is much like *C. didyma*, and certain writers still consider it a variety of that species. In 1931, however, Robbins and Blake (12, p. 154) expressed the opinion that its validity as a species should be recognized. The most important difference between the two is chemical in nature. In *C. didyma* there is no color change with potassium hydroxide and the reaction with paraphenylenediamine is either wholly negative or causes a pale yellow coloration. In *C. vulcanica*, on the other hand, potassium hydroxide gives a bright yellow color and paraphenylenediamine a definite red, indicating the presence of thamnolic acid (see 26, p. 6), as in *C. macilenta*. The New Jersey specimens of *C. vulcanica* may be referred to the following form, in which the podetia are only 2.5-8 mm. in length:—

9Aa.* CLADONIA VULCANICA f. MINOR Robbins; in Robbins and Blake, *Rhodora* 33: 154 pl. 210, f. 7. 1931. MORRIS: Great Swamp near Mt. Vernon. OCEAN: Bamber Lake and Forked River.

Subsection 2. STRAMINEO-FLORIDAE

10. CLADONIA PLEUROTA (Floerke) Schaer. (25, p. 89). BERGEN: Allendale, Alpine, Bear Swamp Pond, Darlington, Emerson (1938), Franklin Lake and Mills, Hohokus (1938), Mahwah (1938), Paramus (1938), Ridgewood (1938), Saddle River (*Mrs. Dunham*, 1939), Waldwick, Washington, and Wyckoff. BURLINGTON: near Red Lion (*Div.*, 1939). ESSEX: Cedar Grove and North Caldwell. HUNTERDON: Silver Hill. MERCER: Dutch Neck and Mt. Rose. MIDDLESEX: Rhode Hall and South River. MONMOUTH: Ardena, Cranberry Hill, and Morganville. MORRIS: Great Swamp near Mt. Vernon, Green Village, Littleton, Mt. Freedom, New Vernon, Oak Ridge, and Waughaw Mountain. OCEAN: Island Beach (*Div.*, 1939), and Pasadena. PASSAIC: Bearfort Mountain, Franklin Clove, Goffle Ridge and High Mountain near Haledon, Haskell, Hewitt, Monks, and Mountain Glen Lakes near Upper Macopin. SOMERSET: Lamington and Lyons. SUSSEX: Andover, Colesville, Hamburg Mountain, Kittatinny Mountain, south of Lake Hartung Road (1938), Rock View near Montague, and near Sparta Lake (1938). UNION: Fanwood and Seely's Glen.

10a. CLADONIA PLEUROTA var. FRONDESCENS (Nyl.) Oliv. (25, p. 90). BERGEN: Darlington. GLOUCESTER: Mullica Hill.

11. *CLADONIA RAVENELII* Tuck. (25, p. 90). Accredited to New Jersey by Sandstede (35, p. 26; 36, p. 99), presumably on the basis of the specimens recorded by the writer.

12. *CLADONIA CRISTATELLA* Tuck. (25, p. 90). Accredited to New Jersey by Sandstede (36, p. 99). BERGEN: Paramus (1938) and Ridgewood (1938). ESSEX: Cedar Grove and North Caldwell. HUNTERDON: Bissell and Silver Hill. MERCER: Sourland Mountain (*Dix*, 1939). MORRIS: near Charlotteburg (1938). PASSAIC: Mountain Glen Lakes near Upper Macopin. SOMERSET: Lamington and Warrenville. UNION: Mountainside. The specimens in this list are indefinite as to form.

12a. *CLADONIA CRISTATELLA* f. *BEAUVOISII* (Del.) Vainio (25, p. 90). BERGEN: Allendale, Bear Swamp Pond, Darlington, Emerson (1938), Franklin Lake and Mills, Hackensack (1938), Hohokus (1938), Mahwah (1938), Maywood (1938), Oradell (1938), Paramus (1938), Rochelle Park (1938), Saddle River (*Mrs. Dunham*, 1939), Upper Saddle River (1938), Waldwick, Washington (*Mrs. Dunham*, 1939), and Wyckoff. BURLINGTON: Atsion (1938), near Bordentown (*Dix*, 1939), Green Bank (1938), Martha (1938), and Quaker Bridge (1938). CUMBERLAND: Vineland. ESSEX: Cedar Grove and North Caldwell. GLOUCESTER: Bridgeport and Mullica Hill. HUNTERDON: Bissell, near Flemington (*Dix*, 1939), Oldwick, Rileyville, Ringoes, and Silver Hill. MERCER: Hopewell (*Dix*, 1939) and Rosedale. MIDDLESEX: Metuchin, Old Bridge, Rhode Hall, and South River. MONMOUTH: Ardena, near Asbury Park (*Evans*, 1939), Cranberry Hill, and Morganville. MORRIS: Green Village, Hanover Neck, Littleton, Mt. Freedom, New Vernon, and Oak Ridge. OCEAN: Forked River, Laurelton, and Pasadena. PASSAIC: Franklin Notch, Monks, and Mountain Glen Lakes near Upper Macopin. SALEM: Elmer and Norma. SOMERSET: Lamington and Lyons. SUSSEX: Andover, Colesville, Hamburg Mountain, Kittatinny Mountain, and near Sparta Lake (1938). UNION: Fanwood and Mountainside.

12b. *CLADONIA CRISTATELLA* f. *VESTITA* Tuck. (25, p. 91). The present form accompanies f. *beauvoisii* in all the stations listed above except Silver Hill, Hanover Neck, Pasadena, and Andover. The following additional stations for f. *vestita* may also be recorded:—BERGEN: Alpine and Hillsdale (1938). ESSEX: Eagle

Rock Reservation (1938) and South Mountain Reservation (1938). MERCER: Mt. Rose and Trenton (*Dir*, 1939). MIDDLESEX: Menlo Park. MONMOUTH: Spring Valley. MORRIS: Berkeley Heights, Great Swamp near Mt. Vernon, Meyersville and Waughaw Mountain. PASSAIC: Goffle Ridge (1938) and High Mountain near Haledon, Haskell, Hewitt, and Stonetown. SOMERSET: North Plainfield. SUSSEX: south of Lake Hartung Road (1938). UNION: Seely's Glen. WARREN: White Lake near Marksboro (1938) and Lookout Rock near Pequest (1938).

12c. CLADONIA CRISTATELLA f. SQUAMOSISSIMA Robbins (25, p. 91). BERGEN: Emerson (1938), Franklin Lake, Hohokus (1938), Mahwah (1938), Rochelle Park (1938), and Waldwick. BURLINGTON: near Bordentown (*Dir*, 1939). ESSEX: North Caldwell. MONMOUTH: Morganville.

12e. CLADONIA CRISTATELLA f. SCYPHULIFERA Sandst. (25, p. 91). BERGEN: Allendale, Closter, Darlington, Franklin Lake, Hohokus (1938), Mahwah (1938), Paramus, Rochelle Park (1938), Waldwick, Washington, and Wyckoff. ESSEX: North Caldwell. HUNTERDON: near Flemington (*Dir*, 1939) and Rileyville. MIDDLESEX: South River. MORRIS: Green Village, Littleton, Mt. Freedom, and New Vernon. PASSAIC: Mountain Glen Lakes near Upper Macopin. SALEM: Norma. SOMERSET: Lamington, Lyons, and Warrenville. SUSSEX: Andover and Kittatiny Mountain. UNION: Mountainside.

12f. CLADONIA CRISTATELLA f. OCHROCARPIA Tuck. (25, p. 91). BERGEN: Darlington, Mahwah (1938), Paramus (1938), and Washington. ESSEX: North Caldwell. PASSAIC: Franklin Clove. SALEM: Norma. SOMERSET: Lyons. SUSSEX: Andover.

12g. CLADONIA CRISTATELLA f. SQUAMULOSA Robbins (25, p. 91). BERGEN: Allendale, Emerson (1938), Franklin Lake, Hohokus (1938), Mahwah (1938), Maywood (1938), Paramus (1938), Ridgewood (1938), Rochelle Park (1938), and Washington. HUNTERDON: Oldwick and Rileyville. MERCER: Pennington (*Dir*, 1939). MIDDLESEX: Old Bridge. MORRIS: Green Village and New Vernon. OCEAN: Lakewood (*Dir*, 1939). PASSAIC: Franklin Clove. SOMERSET: Warrenville. UNION: Mountainside.

12h.* CLADONIA CRISTATELLA f. ABBREVIATA Merrill (4, p. 409). BERGEN: Allendale, Franklin Lake, Paramus, Ridgewood (1938), Rochelle Park (1938), and Washington. HUNTERDON:

Bissell. MIDDLESEX: Metuchin. SUSSEX: Rock View near Montague.

12i.* *CLADONIA CRISTATELLA* f. *AURANTIACA* Robbins (6, p. 41). BERGEN: Darlington, Franklin Mills, Hohokus (1938), and Mahwah (1938). HUNTERDON: Oldwick. SALEM: Norma.

12j.* *CLADONIA CRISTATELLA* f. *PLEUROCARPA* Robbins (4, p. 408). BERGEN: Alpine, Closter, Darlington, Emerson (1938), Hackensack (1938), and Wyckoff. BURLINGTON: near Bordentown (*Dir*, 1939). HUNTERDON: Oldwick. MONMOUTH: Cranberry Hill. MORRIS: Green Village, Littleton, and Oak Ridge. PASSAIC: High Mountain near Haledon. UNION: Mountainside.

13. *CLADONIA INCRASSATA* Floerke (25, p. 91). BERGEN: Bear Swamp Pond and Ridgewood (1938). MONMOUTH: Cranberry Hill. MORRIS: Great Swamp near Mt. Vernon (1938). OCEAN: Bamber Lake, Forked River, Lakewood (*Dir*, 1939), Laurelton, and Sim's Place. PASSAIC: Haskell and Stonetown. SUSSEX: Andover, Kittatinny Mountain, and Rock View near Montague.

13a. *CLADONIA INCRASSATA* f. *SQUAMULOSA* (Robbins) Evans (25, p. 92). OCEAN: Bamber Lake.

13b.* *CLADONIA INCRASSATA* f. *EPIPHYLLA* (Fr.) Vainio, Acta Soc. F. et Fl. Fennica 14:231. 1897 (as modification); Zahlbruckner, Cat. Lich. Univ. 4:551. 1927 (as form). *C. cornucupioides* f. *epiphylla* Fr. Nov. Sched. Crit. 20. 1826. SUSSEX: Andover. New to North America. In this form the podetia are so reduced that the apothecia appear to be sessile or nearly so on the primary squamules.

Section 2. OCHROPHAEAE

Subsection 1. UNCIALES

14. *CLADONIA UNCIALIS* (L.) Web. (25, p. 92). BERGEN: Bear Swamp Pond, Franklin Lake, near Mahwah (1938), and Paramus. BURLINGTON: near Bordentown (*Dir*, 1939) and Jenkins (1938). CUMBERLAND: Vineland. GLOUCESTER: Mullica Hill. HUNTERDON: Mt. Airy (*Dir*, 1939). MIDDLESEX: Old Bridge, Rhode Hall, and South River. MONMOUTH: Ardena, near Asbury Park (*Evans*, 1939), Cranberry Hill, Morganville, and Spring Valley. MORRIS: Oak Ridge. OCEAN: Island Beach, Pasadena, and Sim's Place. PASSAIC: Bearfort Mountain, Franklin Notch (1938), Goffle Ridge near Haledon, Haskell, Hewitt (*Nearing &*

Thomson, 1939), Monks, Mountain Glen Lakes near Upper Macopin, and Stonetown. SUSSEX: Andover, Colesville, and Hamburg Mountain. UNION: Seely's Glen.

14a. *CLADONIA UNCIALIS* f. *OBTUSATA* (Ach.) Vainio (25, p. 92). OCEAN: Lakehurst (*Cohn*, 1936).

14d. *CLADONIA UNCIALIS* f. *SPINOSA* Oliv. (25, p. 93). BERGEN: Paramus. PASSAIC: Stonetown.

14e. *CLADONIA UNCIALIS* f. *SETIGERA* Anders (25, p. 93). BERGEN: Ridgewood (1938). BURLINGTON: Quaker Bridge (1938). MIDDLESEX: Old Bridge. MONMOUTH: Morganville.

15a. *CLADONIA CAROLINIANA* (Schwein.) Tuck. f. *DILATATA* Evans (25, p. 93). BERGEN: Allendale and Bear Swamp Pond. BURLINGTON: near Red Lion (*Dix*, 1939). CUMBERLAND: Vineland. OCEAN: Lakewood (*Dix*, 1939), Laurelton, Pasadena, and Sim's Place. PASSAIC: Franklin Clove, Haskell, Hewitt, Monks, Mountain Glen Lakes near Upper Macopin, and Stonetown.

15c. *CLADONIA CAROLINIANA* f. *TENUIRAMEA* Evans (25, p. 93). BERGEN: near Mahwah (1938). BURLINGTON: Green Bank (1938) and Martha (1938). CUMBERLAND: Vineland. MONMOUTH: near Asbury Park (*Evans*, 1939) and Cranberry Hill. OCEAN: Bamber Lake, Forked River, Laurelton, and Sim's Place. PASSAIC: Stonetown. SUSSEX: Hamburg Mountain and Kittatinny Mountain.

15e.* *CLADONIA CAROLINIANA* f. *PROLIFERA* Evans (5, p. 139). PASSAIC: Goffle Ridge near Haledon, Monks, and Stonetown. SUSSEX: Andover.

Subsection 2. CHASMARIAE

Group 1. MICROPHYLLAE

17. *CLADONIA FURCATA* (Huds.) Schrad. (25, p. 94). MIDDLESEX: Rhode Hall (young plants).

17a. *CLADONIA FURCATA* var. *RACEMOSA* (Hoffm.) Floerke (25, p. 95). BERGEN: Bear Swamp Pond, Franklin Lake, and Mahwah (1938). HUNTERDON: Rileyville and Ringoes. MERCER: Hopewell (*Dix*, 1939) and Pennington (*Dix*, 1939). OCEAN: Island Beach (*Dix*, 1939). PASSAIC: Haskell, Hewitt, and Stonetown. SUSSEX: Andover, Colesville, Hamburg Mountain, and near Sussex (*Cohn*, 1936).

17ab. *CLADONIA FURCATA* var. *RACEMOSA* f. *SQUAMULIFERA* Sandst. (25, p. 95). BERGEN: Darlington and Franklin Lake. HUNTERDON: Rileyville and Ringoes. MERCER: Pennington (*Dix*, 1939). PASSAIC: Bearfort Mountain, Franklin Notch (1938), Haskell, Hewitt, Monks, Mountain Glen Lakes near Upper Macopin, and Stonetown. SUSSEX: Franklin, Hamburg Mountain, Rock View near Montague, east of Sparta Lake (1938), and near Sussex (*Cohn*, 1937, det. Sandstede). UNION: Seely's Glen. WARREN: White Lake near Marksboro (1938) and Lookout Rock near Pequest (1938).

17ac. *CLADONIA FURCATA* var. *RACEMOSA* f. *FURCATOSUBULATA* (Hoffm.) Vainio (33, p. 144). ESSEX: Eagle Rock Reservation (1938). MORRIS: Oak Ridge.

17b.* *CLADONIA FURCATA* var. *PALAMAEA* (Ach.) Vainio (4, p. 425). MERCER: Hopewell (*Dix*, 1939).

17Aa. *CLADONIA SCABRIUSCULA* (Del.) Leight. f. *FARINACEA* (Vainio) Sandst. (33, p. 144). BERGEN: Franklin Lake. HUNTERDON: Rileyville. MORRIS: Green Village.

18. *CLADONIA FLORIDANA* Vainio (25, p. 95). Accredited to New Jersey by Sandstede (36, p. 100). BURLINGTON: Martha (1938) and New Lisbon (*Dix*, 1939). MIDDLESEX: Old Bridge. MONMOUTH: near Asbury Park (*Evans*, 1939) and Cranberry Hill. OCEAN: Forked River, Laurelton, and Sim's Place. SUSSEX: Kittatinny Mountain.

18a. *CLADONIA FLORIDANA* f. *TYPICA* Robbins (25, p. 95). OCEAN: Bamber Lake.

18c.* *CLADONIA FLORIDANA* f. *ELEGANS* Robbins, *Rhodora* 29:137. *pl.* 157, *f.* 7. 1927. OCEAN: Bamber Lake. The podetia of f. *elegans* are squamulose and sterile.

18d.* *CLADONIA FLORIDANA* f. *BRACHIATA* Robbins, *Rhodora* 29:137 *pl.* 157, *f.* 2-3. 1927. BURLINGTON: Brown's Mills (*Dix*, 1939). The podetia of f. *brachiata* are sterile as in the preceding form but are destitute of squamules.

19. *CLADONIA SANTENSIS* Tuck. (25, p. 96). Listed from New Jersey by Sandstede (36, p. 100). OCEAN: Forked River and Sim's Place.

20. *CLADONIA SQUAMOSA* (Scop.) Hoffm. (25, p. 96). BERGEN: Bear Swamp Pond and Franklin Mills. ESSEX: North Cald-

well. MORRIS: near Charlotteburg (1938). OCEAN: Forked River. PASSAIC: Bearfort Mountain and Mountain Glen Lakes near Upper Macopin. SUSSEX: near Flat Brook (*Bowen*, 1932), Hamburg Mountain, and Kittatinny Mountain. The specimens in this list are indefinite as to form.

20c. CLADONIA SQUAMOSA f. LEVICORTICATA Sandst. (25, p. 97). BERGEN: Emerson (1938) and Ridgewood (1938). CUMBERLAND: Vineland. GLOUCESTER: Mullica Hill. MIDDLESEX: Old Bridge, Rhode Hall, and South River. MONMOUTH: near Asbury Park (*Evans*, 1939), Morganville, and Spring Valley. MORRIS: Littleton. OCEAN: Forked River (*Cohn*, 1937), Island Beach (*Dix*, 1939) and Lakewood (*Dix*, 1939).

20ca. CLADONIA SQUAMOSA f. LEVICORTICATA m. PSEUDOCRISPATA Sandst. (25, p. 97). OCEAN: Pasadena.

20cb. CLADONIA SQUAMOSA f. LEVICORTICATA m. RIGIDA (Del.) Evans (25, p. 97). BERGEN: Allendale, Alpine, Bear Swamp Pond, Darlington, Franklin Lake and Mills, Hohokus (1938), near Mahwah (1938), Maywood (1938), Paramus (1938), Ridgewood (1938), Saddle River (*Mrs. Dunham*, 1939), Upper Saddle River (1938), Washington (*Mrs. Dunham*, 1938), and Wyckoff. BURLINGTON: Jenkins (1938), Martha (1938), New Lisbon (*Dix*, 1939), and Quaker Bridge (1938). ESSEX: Cedar Grove and North Caldwell. HUNTERDON: Oldwick. MERCER: Dutch Neck and Sourland Mountain (*Dix*, 1939). MIDDLESEX: South River. MONMOUTH: Ardena. MORRIS: near Charlotteburg (1938), Green Village, Hanover Neck, and New Vernon. OCEAN: Sim's Place. PASSAIC: Franklin Notch (1938), Hewitt, and Stonetown. SOMERSET: North Plainfield and Warrentown. UNION: Fanwood, Mountainside, and Watchung.

20cc. CLADONIA SQUAMOSA f. LEVICORTICATA m. PITYREA (Arn.) Evans (33, p. 145). BERGEN: Darlington, Hohokus (1938), near Mahwah (1938), and Paramus (1938). BURLINGTON: Atsion (1938) and Brown's Mills (*Dix*, 1939). ESSEX: North Caldwell. GLOUCESTER: Mullica Hill. MONMOUTH: Ardena and Cranberry Hill. MORRIS: Green Village. OCEAN: Lakehurst (*Cohn*, 1936), Lakewood (*Dix*, 1939), and Sim's Place. PASSAIC: Franklin Clove and Hewitt. SALEM: Centerton. SUSSEX: Kittatinny Mountain and Rock View near Montague. UNION: Seely's Glen. WARREN: White Lake near Marksboro (1938).

20g. *CLADONIA SQUAMOSA* f. *MURINA* Scriba (33, p. 145). BERGEN: Bear Swamp Pond (det. Sandstede).

20h.* *CLADONIA SQUAMOSA* f. *CALLOSA* (Del.) Anders (6, p. 45). SUSSEX: High Point Park (1938, det. Sandstede).

20i.* *CLADONIA SQUAMOSA* f. *SQUAMOSISSIMA* Floerke (4, p. 434). PASSAIC: Haskell.

21. *CLADONIA DELICATA* (Ehrh.) Floerke (25, p. 98). GLOUCESTER: Bridgeport. MORRIS: Green Village. New Vernon, and Waughaw Mountain. SALEM: Elmer. SUSSEX: Andover and Rock View near Montague. The specimens upon which these records are based are incompletely developed and show few or no podetia.

21a. *CLADONIA DELICATA* f. *QUERCINA* (Pers.) Vainio (25, p. 98). BERGEN: Bear Swamp Pond, Darlington, Franklin Lake and Mills, Hohokus (1938), Paramus, Ridgewood (1938), Saddle River (1938), Washington, and Wyckoff. BURLINGTON: Martha (1938). HUNTERDON: Mountainville and Rileyville. MIDDLESEX: Rhode Hall. MONMOUTH: Ardena and Cranberry Hill. MORRIS: Great Swamp near Mt. Vernon and Meyersville. OCEAN: Sim's Place. PASSAIC: Franklin Notch (1938), Haskell, Hewitt (*Nearing & Thomson*, 1939), and Mountain Glen Lakes near Upper Macopin. SUSSEX: Hamburg Mountain. UNION: Fanwood.

22. *CLADONIA CAESPITICIA* (Pers.) Floerke (25, p. 98). BERGEN: Alpine, Closter, Darlington, Emerson (1938), Franklin Mills, Hackensack (1938), Hohokus (1938), near Mahwah (1938), Ridgewood (1938), Rochelle Park (1938), Saddle River (1938), Washington, and Wyckoff. BURLINGTON: Martha (1938). ESSEX: North Caldwell. GLOUCESTER: Bridgeport. MERCER: Dutch Neck. MIDDLESEX: South River. MONMOUTH: Cranberry Hill. MORRIS: Green Village and Mt. Freedom. OCEAN: Lakewood. PASSAIC: Franklin Clove, Great Swamp near Mt. Vernon, High Mountain near Haledon, Haskell, and Hewitt. SALEM: Centerton and Elmer. SUSSEX: Hamburg Mountain and Kittatinny Mountain. UNION: Fanwood and Seely's Glen.

22A.* *CLADONIA NANODES* Robbins in Sandstede, Fedde's Repert. Spec. Nov. Regn. Veg. 103 (Beih.): 60. 1938. ATLANTIC: Port Republic (*Torrey*, 1936, det. Sandstede). According to Sandstede's brief description of *C. nanodes* the primary squamules are

small and the strongly convex apothecia almost sessile. He notes also that the species is negative with potassium hydroxide and positive with paraphenylenediamine. In these respects it agrees with *C. caespiticia* and *C. apodocarpa*, and Sandstede considers it a relative of the latter. Although he gives no stations for *C. nanodes* the name was first applied by Robbins to specimens from Wareham, Massachusetts, and this may be regarded as the type-locality. In the material from New Jersey the primary squamules are smaller than those of *C. apodocarpa* and fail to show the caducous habit characteristic of that species. They differ from the primary squamules of *C. caespiticia* in being undivided or only sparingly lobed.

Group 2. MEGAPHYLLAE

23. *CLADONIA APODOCARPA* Robbins (25, p. 98). BERGEN: Alpine, Bear Swamp Pond, Darlington, Franklin Lake, and Mahwah (1938). ESSEX: North Caldwell. HUNTERDON: Rileyville and Ringoes. MORRIS: Great Swamp near Mt. Vernon, Mt. Freedom, Oak Ridge, Stirling, and Waughaw Mountain. OCEAN: Pasadena. PASSAIC: Franklin Notch (1938), Goffe Ridge near Haledon, Haskell, Hewitt, Monks, Mountain Glen Lakes near Upper Macopin, and Stonetown. SALEM: Centerton. SOMERSET: Lyons. SUSSEX: Andover, Colesville, Hamburg Mountain, Kittatinny Mountain, Ogdensburg, Rock View near Montague, and near Sparta Lake (1938). UNION: Seely's Glen. WARREN: White Lake near Marksboro (1938) and Lookout Rock near Pequest (1938).

Subsection 3. CLAUSAE

Group 1. PODOSTELIDES

24. *CLADONIA MITRULA* Tuck. (25, p. 99). Listed from New Jersey by Sandstede (35, p. 88). BERGEN: Upper Saddle River. HUNTERDON: Bissell. PASSAIC: Franklin Clove (1938). These specimens consist of little more than the primary squamules.

24a. *CLADONIA MITRULA* f. *IMBRICATULA* (Nyl.) Vainio (25, p. 99). BERGEN: Bear Swamp Pond, Darlington, Franklin Lake and Mills, Hohokus (1938), Mahwah (1938), Maywood (1938), Ridgewood (1938), Saddle River (*Mrs. Dunham*, 1939), Upper Saddle River (1938), Waldwick, Washington (*Mrs. Dunham*,

1938), and Wyckoff. BURLINGTON: Martha (1938). ESSEX: North Caldwell. GLOUCESTER: Bridgeport. HUNTERDON: Bissell, near Flemington (*Dix*, 1939), Mountainville, Oldwick, Ringoes, Silver Hill and Sourland Mountain (*Dix*, 1939). MERCER: Dutch Neck, Hopewell (*Dix*, 1939), Pennington (*Dix*, 1939), and Rosedale. MONMOUTH: Cranberry Hill. MORRIS: Great Swamp near Mt. Vernon, Green Village, Meyersville, Mt. Freedom, New Vernon, and Oak Ridge. OCEAN: Lakewood and Sim's Place. PASSAIC: Franklin Clove, Haskell, Hewitt (*Nearing & Thomson*, 1939), and Mountain Glen Lakes near Upper Macopin. SALEM: Centerton and Elmer. SOMERSET: Lyons. SUSSEX: Kittatinny Mountain and near Sparta Lake (1938). UNION: Fanwood. WARREN: White Lake near Marksboro (1938) and Pequest (1938).

24b. CLADONIA MITRULA f. PALLIDA Robbins (25, p. 99). BURLINGTON: Martha (1938). HUNTERDON: near Flemington (*Dix*, 1939) and Oldwick. MERCER: Pennington (*Dix*, 1939). MONMOUTH: Cranberry Hill. PASSAIC: Hewitt. SUSSEX: Andover (*Dix*, 1939) and Kittatinny Mountain.

24c.* CLADONIA MITRULA f. SQUAMULOSA Merrill, Bryologist 27:23. 1924. MERCER: Pennington (*Dix*, 1939). MIDDLESEX: Matuchin (*Nearing*, 1939, the earliest New Jersey record). SUSSEX: Andover (*Dix*, 1939). This interesting form is distinguished by the presence of squamules on the podetia. It was based on specimens collected by J. L. Sheldon at Sturgisson, West Virginia, and apparently no other stations have been recorded in the literature.

25. CLADONIA CLAVULIFERA Vainio (25, p. 100). Listed from New Jersey by Sandstede (36, p. 100). BERGEN: Allendale. GLOUCESTER: Bridgeport. SUSSEX: Andover. UNION: Seely's Glen. These specimens are not referable to any definite form.

25a. CLADONIA CLAVULIFERA f. NUDICAULIS Evans (25, p. 100). BERGEN: Darlington, Franklin Mills, Mahwah (1938), Paramus (1938), and Ridgewood (1938). BURLINGTON: Martha (1938). CUMBERLAND: Vineland. ESSEX: Cedar Grove, Eagle Rock Reservation (1938), and North Caldwell. MONMOUTH: Morganville. MORRIS: Mt. Freedom. PASSAIC: Hewitt. SALEM: Norma. SUSSEX: Colesville. UNION: Mountainside.

25b. CLADONIA CLAVULIFERA f. SUBVESTITA Robbins (25, p. 100). BERGEN: Darlington, Mahwah (1938) and Paramus (1938). CUMBERLAND: Vineland. ESSEX: North Caldwell. OCEAN: Island

Beach (*Dix*, 1939) and Lakewood (*Dix*, 1939). SALEM: Norma.

25d. CLADONIA CLAVULIFERA f. PLEUROCARPA Robbins (33, p. 146). BERGEN: Darlington and Franklin Mills. MORRIS: Mt. Freedom.

26. CLADONIA SUBCARIOSIA Nyl. (25, p. 100). BERGEN: Emerson (1938), Franklin Mills, Hackensack (1938), Hillsdale (1938), Hohokus (1938), Maywood (1938), Rochelle Park (1938), Upper Saddle River (1938), Waldwick, Washington, and Wyckoff. MERCERS near Hopewell (*Dix*, 1939), Rosedale, and Trenton (*Dix*, 1939). PASSAIC: Franklin Notch (1938): SOMERSET: Lyons. SUSSEX: south of Lake Hartung Road (1938). UNION: Fanwood and Seely's Glen. WARREN: White Lake near Marksboro (1938). The specimens upon which these records are based are either sterile or indefinite as to form.

26a. CLADONIA SUBCARIOSIA f. EVOLUTA Vainio (25, p. 100). BERGEN: Bear Swamp Pond, Darlington, Emerson (1938), Franklin Lake and Mills, Hohokus (1938), Maywood (1938), Paramus (1938), Ridgewood (1938), Saddle River (*Mrs. Dunham*, 1939), and Upper Saddle River (1938). BURLINGTON: near Red Lion (*Dix*, 1939). CUMBERLAND: Vineland. ESSEX: Cedar Grove and North Caldwell. GLOUCESTER: Bridgeport and Mullica Hill. HUNTERDON: Bissell, Mountainville, Oldwick, Rileyville, Ringoes, and Silver Hill. MERCER: Dutch Neck and Mt. Rose. MORRIS: Berkeley Heights, Green Village, Littleton, New Vernon, Oak Ridge, and Stirling. PASSAIC: High Mountain near Haledon, Haskell, Hewitt (*Thomson*, 1939), and Monks. SOMERSET: Lamington and Warrenville. SUSSEX: Andover, Colesville, Hamburg Mountain, and Rock View near Montague. WARREN: White Lake near Marksboro (1938).

26b. CLADONIA SUBCARIOSIA f. SQUAMULOSA Robbins (33, p. 100). BERGEN: Darlington. ESSEX: Cedar Grove and North Caldwell. GLOUCESTER: Mullica Hill. HUNTERDON: Oldwick and Rileyville. MERCER: Sourland Mountain (*Dix*, 1939) and Mt. Rose. MORRIS: Green Village and New Vernon. PASSAIC: High Mountain near Haledon. SUSSEX: Ogdensburg.

26c.* CLADONIA SUBCARIOSIA f. PLEUROCARPA Robbins (4, p. 451). HUNTERDON: Rileyville. SUSSEX: Colesville.

Group 2. THALLOSTELIDES

26B.* *CLADONIA GRACILIS* (L.) Willd. (4, p. 456). As already shown by the writer (25, p. 101) the earlier New Jersey records for *C. gracilis* were based on other species or were otherwise untrustworthy. It is now possible, however, to report the species definitely from the state. The form represented is the following:—

26Baa.* *CLADONIA GRACILIS* var. *DILATATA* (Hoffm.) Vainio f. *SQUAMULOSA* (Schaer.) Sandst. (4, p. 458). SUSSEX: Kittatinny Mountain.

27. *CLADONIA VERTICILLATA* (Hoffm.) Schaer. (25, p. 101). BERGEN: Allendale, Hohokus (1938), Ridgewood (1938), and Wyckoff. MORRIS: Littleton. These records are based on incompletely developed specimens.

27a. *CLADONIA VERTICILLATA* f. *EVOLUTA* (Th. Fr.) Stein (25, p. 101). BERGEN: Allendale, Bear Swamp Pond, Darlington, Franklin Mills, Saddle River (*Mrs. Dunham*, 1939), and Waldwick. ESSEX: North Caldwell. HUNTERDON: Bissell, Oldwick, and Silver Hill. MERCER: Mt. Rose. MORRIS: Green Village, Mt. Freedom, New Vernon, Oak Ridge, and Stirling. OCEAN: Island Beach (*Dix*, 1939), Lakewood (*Dix*, 1939), and Sim's Place. PASSAIC: Hewitt and Stonetown. SOMERSET: Warrenville. SUSSEX: Andover, Colesville, and Kittatinny Mountain. WARREN: White Lake near Marksboro (1938).

27b.* *CLADONIA VERTICILLATA* f. *AGGREGATA* (Del.) Oliv. (6, p. 50). BERGEN: Allendale, Franklin Mills, and Hohokus (1938, det. Sandstede). MORRIS: Green Village. SUSSEX: Andover and Kittatinny Mountain.

27c.* *CLADONIA VERTICILLATA* f. *APOTICTA* (Ach.) Vainio (4, p. 460). BERGEN: Darlington and Ridgewood (1938). ESSEX: North Caldwell. HUNTERDON: Oldwick.

27d.* *CLADONIA VERTICILLATA* f. *PHYLLOCEPHALA* (Flot.) Oliv. (4, p. 461). UNION: Mountainside.

28. *CLADONIA CALYCANTHA* Del. (25, p. 101). BERGEN: Franklin Mills. BURLINGTON: Red Lion (*Dix*, 1939). HUNTERDON: Oldwick. MONMOUTH: Cranberry Hill. OCEAN: Forked River. PASSAIC: Haskell. SALEM: Centerton. WARREN: White Lake near Marksboro (1938).

28a. *CLADONIA CALYCANTHA* f. *FOLIOSA* Vainio (25, p. 103). BERGEN: Franklin Mills. BURLINGTON: near Red Lion (*Dix*, 1939). OCEAN: Forked River. WARREN: White Lake near Marksboro (1938).

28A. *CLADONIA MATEOCYATHA* Robbins (33, p. 147). BERGEN: Darlington and Emerson (1938). These records are based on specimens with poorly developed podetia.

29aa. *CLADONIA PYXIDATA* (L.) Hoffm. var. *NEGLECTA* (Floerke) Mass. f. *SIMPLEX* (Ach.) Harm. (25, p. 103). SUSSEX: Andover, Colesville, and Ogdensburg.

30. *CLADONIA CHLOROPHAEA* (Floerke) Spreng. (25, p. 104). BERGEN: Allendale, Bear Swamp Pond, Closter, Emerson (1938), Franklin Mills, Hackensack (1938), near Mahwah (1938), Ridgewood (1938), Upper Saddle River, and Waldwick. BURLINGTON: Martha. ESSEX: Cedar Grove and North Caldwell. HUNTERDON: Bissell. MONMOUTH: Cranberry Hill. MORRIS: Green Village, Littleton, and Waughaw Mountain. OCEAN: Forked River, Island Beach (*Dix*, 1939), Lakewood (*Dix*, 1939), and Sim's Place. PASSAIC: Hewitt, High Mountain near Haledon, and Mountain Glen Lakes near Upper Macopin. SUSSEX: Hamburg Mountain and Ogdensburg. UNION: Seely's Glen. WARREN: White Lake near Marksboro (1938). These specimens are either mixtures of various forms or indefinite as to form.

30b. *CLADONIA CHLOROPHAEA* f. *SIMPLEX* (Hoffm.) Arn. (33, p. 147). BERGEN: Darlington, Emerson (1938), Franklin Lake and Mills, near Mahwah (1938), Paramus (1938), and Washington. BURLINGTON: Martha (1938). HUNTERDON: Mountainville. MONMOUTH: near Asbury Park (*Evans*, 1939). MORRIS: Mt. Freedom. PASSAIC: Haskell, Monks, and Stonetown. SALEM: Elmer. SOMERSET: Lyons. SUSSEX: Andover, Colesville, and Franklin. UNION: Mountainside. WARREN: Lookout Rock near Pequest (1938).

30c. *CLADONIA CHLOROPHAEA* f. *CARPOPHORA* (Floerke) Anders (33, p. 147). BERGEN: Emerson (1938).

30d.* *CLADONIA CHLOROPHAEA* f. *CONISTEA* Del. (26, p. 18). BERGEN: Franklin Mills and Waldwick. BURLINGTON: Martha (*Nearing & Small*, 1939). HUNTERDON: Oldwick.

30e.* *CLADONIA CHLOROPHAEA* f. *PTERYGOTA* (Floerke) Vainio (4, p. 470). BURLINGTON: Martha (1938, det. Sandstede).

30f.* CLADONIA CHLOROPHAEA f. LEPIDOPHORA (Floerke) Sandst. (4, p. 471). OCEAN: Forked River.

31. CLADONIA GRAYI Merrill (25, p. 104). Listed from New Jersey by Sandstede (35, p. 90). BERGEN: Allendale, Bear Swamp Pond, Emerson (1938), Franklin Lake and Mills, Hillsdale (1938), Hohokus (1938), near Mahwah (1938), Waldwick, Washington, and Wyckoff. BURLINGTON: Atsion (1938). ESSEX: Cedar Grove. GLOUCESTER: Bridgeport and Mullica Hill. HUNTERDON: Oldwick and Rileyville. MERCER: near Hopewell (*Dix*, 1939), Mt. Rose, and Trenton (*Dix*, 1939). MIDDLESEX: Menlo Park. MONMOUTH: Ardena, Morganville, and Spring Valley. MORRIS: Great Swamp near Mt. Vernon, Green Village, Hanover Neck, Mt. Freedom, New Vernon, Oak Ridge, and Waughaw Mountain. OCEAN: Lakewood, Pasadena, and Sim's Place. PASSAIC: Franklin Notch (1938), Goffle Ridge near Haledon, Hewitt (*Nearing & Thomson*, 1939), and Monks. SALEM: Centerton, Elmer, and Norma. SOMERSET: Lyons and North Plainfield. SUSSEX: Andover, Colesville, and south of Lake Hartung Road (1938). UNION: Mountainside. The specimens upon which these records are based are mostly indefinite as to form.

31a. CLADONIA GRAYI f. SIMPLEX Robbins (33, p. 148). BERGEN: Closter, Darlington, Mahwah (1938), Maywood (1938), Paramus (1938), Ridgewood (1938), Saddle River (1938), and Upper Saddle River (1938). BURLINGTON: Green Bank (1938) and Quaker Bridge (1938). ESSEX: North Caldwell. MIDDLESEX: Old Bridge and South River. MERCER: near Hopewell (*Dix*, 1939) and Trenton (*Dix*, 1939). MONMOUTH: Cranberry Hill and Spring Valley. MORRIS: Green Village, Littleton, and Stirling. OCEAN: Pasadena. PASSAIC: High Mountain near Haledon and Haskell. SOMERSET: Lamington. UNION: Fanwood and Seely's Glen.

31b. CLADONIA GRAYI f. CARPOPHORA Evans (33, p. 148). BERGEN: Darlington and Hohokus (1938). BURLINGTON: Brown's Mills (*Dix*, 1939), Jenkins (1938), and Vincentown (*Dix*, 1939). CUMBERLAND: Vineland. ESSEX: North Caldwell. MERCER: Pennington (*Dix*, 1939). MONMOUTH: Spring Valley. MORRIS: south of Charlotteburg (1938), Green Village and Littleton. OCEAN: Island Beach (*Dix*, 1939). PASSAIC: High Mountain near Haledon. SOMERSET: Lamington and Warrenville. A specimen of this form

collected by Torrey at Green Pond, Morris County (see **33**, p. 148), has been figured by Sandstede (**34**, *pl. 16, f. 7*).

31c. *CLADONIA GRAYI* f. *SQUAMULOSA* Sandst. (**33**, p. 148). BERGEN: Darlington, Franklin Lake, and Saddle River (*Mrs. Dunham*, 1939). HUNTERDON: Sourland Mountain (*Dix*, 1939). MERCER: Hopewell (*Dix*, 1939) and Sourland Mountain (*Dix*, 1939). MORRIS: Hanover Neck and Oak Ridge. OCEAN: Lakewood (*Dix*, 1939).

31Aa. *CLADONIA CONISTA* (Ach.) Robbins f. *SIMPLEX* Robbins (**33**, p. 148). BERGEN: Allendale, Bear Swamp Pond, Closter, Darlington, Mahwah (1938), and Wyckoff. ESSEX: North Caldwell. HUNTERDON: Bissell and Ringoes. MERCER: Dutch Neck. MORRIS: Green Village, Littleton, Meyersville, and New Vernon. OCEAN: Sim's Place. PASSAIC: Mountain Glen Lakes near Upper Macopin. SOMERSET: Lamington. SUSSEX: Colesville and Hamburg Mountain. UNION: Fanwood.

32. *CLADONIA FIMBRIATA* (L.) Fr. (**25**, p. 104). BERGEN: Wyckoff. OCEAN: Lakewood.

33. *CLADONIA NEMOXYNA* (Ach.) Nyl. (**25**, p. 105). BERGEN: Allendale, Closter, Darlington, Franklin Lake and Mills, Hohokus (1938), Mahwah (1938), and Wyckoff. BURLINGTON: Martha (1938) and Green Bank (1938, det. Sandstede). ESSEX: North Caldwell. HUNTERDON: Bissell and Rileyville. MERCER: near Hopewell (*Dix*, 1939), Mt. Rose, and Sourland Mountain (*Dix*, 1939). MONMOUTH: Cranberry Hill and Spring Valley. MORRIS: Littleton and Mt. Freedom. OCEAN: Forked River (*Cohn*, 1937) and Lakewood. PASSAIC: High Mountain near Haledon and Hewitt (*Thomson*, 1939). SUSSEX: Andover (*Dix*, 1939), Kittatinny Mountain and south of Lake Hartung Road (1938). WARREN: White Lake near Marksboro (1938) and Pequest (1938).

33a. *CLADONIA NEMOXYNA* f. *FIBULA* (Ach.) Vainio (**25**, p. 105). OCEAN: Lakewood.

33b.* *CLADONIA NEMOXYNA* f. *REI* (Schaer.) Anders (**26**, p. 23). MERCER: Sourland Mountain (*Dix*, 1939, the earliest New Jersey record). OCEAN: Lakewood.

34. *CLADONIA OCHROCHLORA* Floerke (**25**, p. 105). SUSSEX: Kittatinny Mountain.

35. *CLADONIA CONIOCRAEA* (Floerke) Spreng. (25, p. 105). BERGEN: Alpine and Franklin Lake. MIDDLESEX: Matuchin. PASSAIC: Franklin Clove and Haskell. These specimens are poorly developed and indefinite as to form.

35a. *CLADONIA CONIOCRAEA* f. *CERATODES* (Floerke) Dalla Torre & Sarnth. (25, p. 105). BERGEN: Alpine, Bear Swamp Pond, Darlington, Hillsdale (1938), Hohokus (1938), Mahwah (1938), Paramus (1938), Rochelle Park (1938), Saddle River (1938), Waldwick, Washington, and Wyckoff. BURLINGTON: Atsion (1938) and Martha (1938). ESSEX: North Caldwell and South Mountain Reservation (1938). HUNTERDON: Bissell and Rileyville. MIDDLESEX: Old Bridge and Rhode Hall. MONMOUTH: Ardena, Cranberry Hill, and Spring Valley. MORRIS: Great Swamp near Mt. Vernon, Green Village, Meyersville, Mt. Freedom, New Vernon, Oak Ridge, and Waughaw Mountain. OCEAN: Lakewood and Laurelton. PASSAIC: Franklin Notch, Goffle Ridge (1938) and High Mountain near Haledon, Haskell, Hewitt (*Nearing & Thomson*, 1939), Monks, Mountain Glen Lakes near Upper Macopin, and Stonetown. SALEM: Centeron and Elmer. SUSSEX: Colesville, Hamburg Mountain, and south of Lake Hartung Road (1938). UNION: Fanwood, Mountainside, and Seely's Glen. WARREN: Lookout Rock near Pequest (1938).

35b. *CLADONIA CONIOCRAEA* f. *TRUNCATA* (Floerke) Dalla Torre & Sarnth. (25, p. 105). BERGEN: Bear Swamp Pond, Darlington, and Waldwick. BURLINGTON: Martha (1938). MORRIS: Great Swamp near Mt. Vernon, Mt. Freedom, and New Vernon. OCEAN: Lakewood. PASSAIC: Franklin Notch (1938), Haskell, and Mountain Glen Lakes near Upper Macopin. SUSSEX: Rock View near Montague.

35c. *CLADONIA CONIOCRAEA* f. *PYCNOTHELIZA* (Nyl.) Vainio (25, p. 106). SUSSEX: Kittatinny Mountain.

35d.* *CLADONIA CONIOCRAEA* f. *EXPANSA* (Floerke) Sandst. (5, p. 160). HUNTERDON: Rileyville. MERCER: Dutch Neck. MONMOUTH: Ardena. PASSAIC: High Mountain near Haledon (det. Sandst.).

35e.* *CLADONIA CONIOCRAEA* f. *PHYLLOSTROTA* (Floerke) Vainio (4, p. 481). BERGEN: Franklin Mills. SUSSEX: Kittatinny Mountain.

35f.* CLADONIA CONIOCRAEA f. ROBUSTIOR (Harm.) Sandst. (5, p. 161). BERGEN: Closter. UNION: Farwood.

35g.* CLADONIA CONIOCRAEA f. STENOSCYPHA (Stuckenberg) Sandst. (26, p. 24). SOMERSET: Lamington. SUSSEX: Hamburg Mountain.

36. CLADONIA BORBONICA (Del.) Nyl. (25, p. 106). Cited from New Jersey by Sandstede (36, p. 94) under the name *C. fimbriata* var. *borbonica* (Del.) Vainio.

36a. CLADONIA BORBONICA f. CYLINDRICA Evans (25, p. 106). BERGEN: Allendale, Bear Swamp Pond, Franklin Lake and Mills, Ridgewood (1938), Saddle River (1938), and Upper Saddle River (1938). ESSEX: North Caldwell. HUNTERDON: Bissell, Mountainville, Rileyville, and Ringoes. MIDDLESEX: Rhode Hall. MONMOUTH: Cranberry Hill. MORRIS: Great Swamp near Mt. Vernon, Green Village, Meyersville, Mt. Freedom, New Vernon, Oak Ridge, and Waughaw Mountain. PASSAIC: Haskell, High Mountain near Haledon, Mountain Glen Lakes near Upper Macopin, and Stonetown. SALEM: Elmer. SUSSEX: Colesville, Hamburg Mountain, Kittatinny Mountain, Ogdensburg, and Rock View near Montague. UNION: Seely's Glen.

37aa. CLADONIA PITYREA (Floerke) Fr. var. ZWACKHII Vainio f. SUBACUTA Vainio (25, p. 106). BERGEN: Bear Swamp Pond, Darlington, and Washington. MONMOUTH: Cranberry Hill. MORRIS: Great Swamp near Mt. Vernon. PASSAIC: Haskell, High Mountain near Haledon and Hewitt (*Thomson*, 1939). SUSSEX: Hamburg Mountain and Kittatinny Mountain.

37ab.* CLADONIA PITYREA var. ZWACKHII f. SQUAMULIFERA Vainio (4, p. 485). BERGEN: Hohokus (1938). SALEM: Elmer. PASSAIC: Haskell.

Group 3. FOLIOSAE

38. CLADONIA STREPSILIS (Ach.) Vainio (25, p. 106). BERGEN: Allendale, Bear Swamp Pond, Darlington, Emerson (1938), Franklin Mills, Ridgewood (1938), Washington, and Wyckoff. BURLINGTON: Martha (1938) and near Red Lion (*Dix*, 1939). ESSEX: North Caldwell. MIDDLESEX: Rhode Hall and South River. OCEAN: Lakewood and Laurelton. PASSAIC: Hewitt. SOMERSET: Lamington, Lyons, and North Plainfield. SUSSEX: Kittatinny

Mountain. The specimens upon which these records are based are composed largely or wholly of primary squamules.

38a. *CLADONIA STREPSILIS* f. *GLABRATA* Vainio (25, p. 106). BERGEN: Emerson (1938) and Paramus (1938). OCEAN: Pasadena. PASSAIC: Franklin Notch (1938).

38b. *CLADONIA STREPSILIS* f. *CORALLOIDEA* (Ach.) Vainio (25, p. 106). BERGEN: Allendale, Closter, Franklin Lake, Mahwah (1938), Paramus (1938), and Washington. GLOUCESTER: Mullica Hill. MONMOUTH: Cranberry Hill. OCEAN: Pasadena. UNION: Seely's Glen.

38c. *CLADONIA STREPSILIS* f. *SUBSESSILIS* Vainio (25, p. 107). BERGEN: Emerson (1938) and Paramus (1938). CUMBERLAND: Vineland. MONMOUTH: Morganville. OCEAN: Forked River. PASSAIC: Haskell. UNION: Seely's Glen.

Group 4. OCHROLEUCAE

39. *CLADONIA PIEDMONTENSIS* Merrill (25, p. 107). MORRIS: Green Village. This material is indefinite as to form.

39a. *CLADONIA PIEDMONTENSIS* f. *LEPIDIFERA* (Vainio) Robbins (25, p. 107). BERGEN: Franklin Lake and Mills and Wyckoff. MERCER: Hopewell (*Dir.*, 1939). SOMERSET: Warrentville.

39c. *CLADONIA PIEDMONTENSIS* f. *SQUAMULOSA* Robbins (25, p. 107). BERGEN: Franklin Mills. MORRIS: New Vernon. SOMERSET: Warrentville.

Collections of *Cladoniae* have now been made in all the counties of New Jersey except the densely populated Hudson County. According to the available records some of the counties are rich in species, whereas others are comparatively poor. This discrepancy is partly due to the fact that certain counties have been more carefully explored than others; but it must also be kept in mind that certain parts of the state afford more favorable conditions than others for the development of a *Cladonia* flora. The pine barren region, for example, with its extensive areas of exposed, uncultivated land, is far better adapted for the growth of *Cladoniae* than a region covered with farms, orchards, and forests.

It is not surprising, therefore, that Ocean County, with 40 species to its credit, stands at the head of the list. Bergen County, however, with 35 species, is a close second, and each of the fol-

lowing counties has more than 25 species: Sussex, 33; Passaic, 31; Burlington and Morris, 28 apiece. The counties at the other end of the series, each with fewer than 15 species, are the following: Middlesex and Cape May, 14 apiece; Salem, 13; Gloucester, 12; and Camden, 7. It will be seen that these include some of the most intensively cultivated areas in the state.

From the standpoint of local distribution *C. cristatella* and *C. squamosa* seem to be the commonest species and are known from 19 counties each. These are followed by *C. tenuis*, known from 18 counties; *C. bacillaris*, *C. grayi*, and *C. mitrula*, from 17 each; and *C. coniocraea*, from 16. Each of the following species, however, is known from a single county: *C. brevis*, *C. gracilis*, *C. impexa*, *C. nanodes*, *C. ravenelii*, and *C. turgida*. Other species with a restricted distribution, according to our present information, are as follows: *C. boryi*, *C. fimbriata*, *C. mateocyatha*, *C. ochrochlora*, and *C. vulcanica*, known from 2 counties each; *C. didyma* and *C. pyxidata*, from 3 each; and *C. floridana*, *C. piedmontensis*, and *C. santensis*, from 4 each.

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